

# IF YOU CAN'T TAKE THE HEAT, GET OUT OF THE CHERRIES: A HIGH TEMPERATURE/CA TREATMENT FOR CODLING MOTH

Lisa G. Neven<sup>1</sup> and Elizabeth Mitcham<sup>2</sup>

<sup>1</sup>USDA-ARS, Fruit and Vegetable Insect Research Unit, Yakima, WA

<sup>2</sup>Department of Pomology, University of California, Davis, CA

**Abstract:** Combination vapor heat with controlled atmospheres were tested as possible quarantine treatment for codling moth in sweet cherries. A novel hot forced air heat treatment unit with humidity and atmosphere control was used to test the potential impact of a combined treatment on codling moth larval mortality. 'Bing' cherries were infested with late 4th early 5th instars of codling moth. The infested cherries were treated at either 45 or 47°C with and without the application of a controlled atmosphere. The atmosphere was controlled to 1.0% O<sub>2</sub> and 15% CO<sub>2</sub>. There was a dramatic effect on larval mortality in the combined treatments over that of the heat treatment alone. LT<sub>99</sub>'s of the heat treatments vs. heat + CA were 124 min vs. 64 min for the 45°C treatment and 72 min vs. 44 min for the 47°C treatment. The total time of treatment can be greatly reduced when a controlled atmosphere is a part of the procedure. This research demonstrates the effectiveness of combined heat with controlled atmospheres as a possible quarantine treatment against codling moth larvae.

**Summary:** This study was conducted in a newly constructed quarantine treatment chamber. The chamber allows for the control of temperature, air speed, dew point, and atmospheres. Cherries infested with fifth instar codling moth were treated in the chamber. Two temperatures with either normal or controlled atmospheres were used. Control atmosphere conditions were 1.0% O<sub>2</sub> and 15% CO<sub>2</sub>.

Table 1. Treatment parameters for cherries infested with fifth instar codling moth.

Parameter	45°C	47°C
FINAL TEMP	44- 44.3°C	46 - 46.2°C
TIME TO TEMP	23 min	25 min
TIME TO >42°C	15 min	12 min
TIME TO >44°C	23 min	15 min
TIME @ TEMP	57 min	25 min
TIME TO CA	29 min	26 min

Treatments at 47°C were more effective in causing fifth instar codling moth mortality than treatments at 45°C. The addition of a controlled atmosphere to the high temperature treatments resulted in higher larval mortalities. The application of a controlled atmosphere together with a heat treatment provides an extra level of insecticidal control above that of the heat treatment alone. The total length and intensity of a heat treatment can be dramatically reduced by the addition of a controlled atmosphere.

Figure 1. Corrected mortality of fifth instar codling moth in 'Bing' cherries subjected to high temperature treatments with and without controlled atmospheres (1.0 %O<sub>2</sub>, 15% CO<sub>2</sub>). RA is mortality of air treatment, CA is mortality of controlled atmosphere treatment.

